aquatic plants collected. HANKINSON then considers the lake fauna in general, concluding with a summary of the life and the life conditions of the littoral and abyssal parts of the lake. Following an appendix with diversified matter are a large number of excellent plates, most of which illustrate the characteristic lake habitats.—HENRY C. COWLES.

Various colored lights and photosynthesis.—It is fast becoming evident that the telling work in the advance of plant physiology is to be done by men who are prepared to work by the exact methods of the physicist and chemist. One feels that KNIEP and MINDER[24] have indicated the way for the final settlement of the perplexing question of the part played in photosynthesis by the various portions of the spectrum. They have given great attention to developing suitable screens and to accurate methods of determining the energy values of the light thus obtained. This is apparently done with exact knowledge and application of the physics involved. Although it is unfortunate that the rate of synthesis must be tested by the bubble method, this seems to be the least objectionable method available. In the light used all heat, as well as infra-red and ultra-violet rays, was cut out by distilled water containing traces of potassium bichromate and ammoniacal copper sulfate. The screens were specially made colored glass, the spectra of which were fully studied. The measurements were made between 11 A.M. and 12:30 P.M. by means of reflected sunlight. The present paper reports the results of measurements of the synthetic value of equal energy intensities (as shown by the blackened thermopyle) of red light (620 $\mu\mu$ toward the infra-red), blue light (523.8 $\mu\mu$ toward the ultra-violet—little transmission to the left of 509 $\mu\mu$), and green light (512–524 $\mu\mu$). Green gave no photosynthesis. Red and blue of equal energy value gave equal photosynthesis. This finding is quite in contrast with the current conception of plant physiologists who hold that the blue end of the spectrum plays little part in the process. This view is due to the fact that the blue screens commonly used reduce to a much greater degree the energy intensity than do the red. It is evident that the relative value of the two portions of the solar spectrum is approximately proportional to the relative energy amounts of the two portions. These relative amounts vary with the time of day, cloudiness, humidity, altitude, etc., the red, of course, being in general greater, but the blue far from negligible. The writers mention that this is only the first step in this important work. They hope by the use of suitable screens, or prism-resolving methods, to study the photosynthetic value of each portion of the spectrum on the basis of its energy value, and to construct a complete curve of this value.—WM. CROCKER.

Germination of the seeds of certain parasites.—The germination of the seeds of various parasites belonging to the Rhinanthaceae has been rather extensively investigated. Two of the more recent studies illustrate two of the more prominent

[24] KNIEP, H., UND MINDER, F., Ueber den Einfluss verschiedenfarbigen Lichtes auf die Kohlensäureassimilation. Zeit. Bot. 1:619–650. 1909.

types of development. In the hemiparasite *Melampyrum pratense*, GAUTHIER[25] found that the seeds germinated without any stimulus from other organisms, and that the seedlings had a short independent existence, during which the roots branched freely. Root hairs developed in abundance, many of them consisting of two or three cells, but before the food stored in the seed became exhausted, the root hairs began to be replaced by haustoria which penetrated the roots of the host. Trees with mycorhiza upon their roots were the hosts, the beech much more frequently than other species. Failure to effect a contact with a suitable host resulted in the early death of the seedlings. . The investigator stated that the seeds, in common with those of Rhinanthus, Euphrasia, and Pedicularis, would not germinate if allowed to become dry.

HEINRICHER studied the same species,[26] obtaining results essentially similar to the above, but he claims[27] that in general the seeds of Rhinanthus, Euphrasia, and Pedicularis are not so sensitive to desiccation, but retain their vitality for several months, although some of them germinate only during the spring. He has studied the group extensively, and in the recent article summarizes the life history of a highly specialized type discussed in a former paper.[28] The seeds of Tozzia germinate only with the chemical stimulus afforded by the roots of the host, its cotyledons never appear above the soil, and for two or three years it is a subterranean holoparasite. Finally it sends up an aerial shoot which becomes green, flowers, and produces seeds. As the seeds mature the plant dies, each individual flowering once only.—GEO. D. FULLER.

Vegetation of the Danish West Indies.—As a result of further study of the halophytic vegetation of the Danish West Indian Islands, BØRGESEN[29] has modified somewhat his former classification of the plant societies involved, and now distinguishes a hydrophytic vegetation composed of sea grass and algae, and a halophytic vegetation embracing the muddy soil vegetation, the sand strand vegetation, and the rocky coast vegetation. The muddy soil vegetation is made to include the mangrove, Salicornia, and Conocarpus formations. The author places emphasis upon the influence of exposure and soil consistency as the deciding factors in limiting the mangrove formation, which he defines as a formation of treelike evergreen plants growing on the sheltered shores, partly in shallow salt or

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[25] GAUTHIER, L., Sur le parasitisme du *Melampyrum pratense*. Rev. Gén. Bot. **20**:67–84. 1908.

[26] HEINRICHER, E., Die grünen Halbschmarotzer, V. Melampyrum. Jahrb. Wiss. Bot. **46**:273–376. 1909.

[27] ———, Germination des graines des plantes parasites. Rev. Gén. Bot. **21**:329–337. 1909.

[28] ———, Die grünen Halbschmarotzer. III. Bartschia und Tozzia. Jahrb. Wiss. Bot. **36**:665–752. 1901.

[29] BØRGESEN, F., Notes on the shore vegetation of the Danish West Indian Islands. Bot. Tidssk. **29**:201–259. *pls. 3–6*. 1909.